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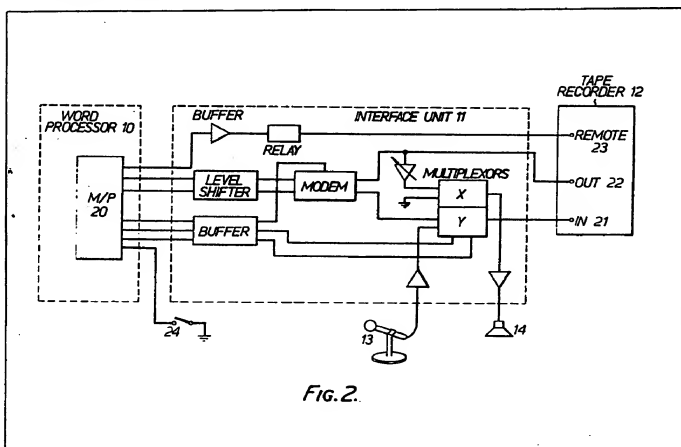
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## (54) Word-processor systems

(57) For use in a word-processor system, an arrangement for supplying the text in a form wherein it is annotated with comments, in which arrangement: using recording means (such as a conventional tape recorder or office dictating machine, 12) operable under the control both of the word-processor (10) and of the commentator, the word-processor directly records digital information identifying the relevant portion of text

currently displayed on the VDU of the word-processor, and the commentator records with a microphone (13) the required comments in association with the text-identifying information; and thereafter the word-processor (10) is operated to display the text, and the recording means (12) is operated to play back (14) the comments, the text-identifying information associated with each comment being used by the word-processor to select the appropriate combination of text for display and comments for play-back.



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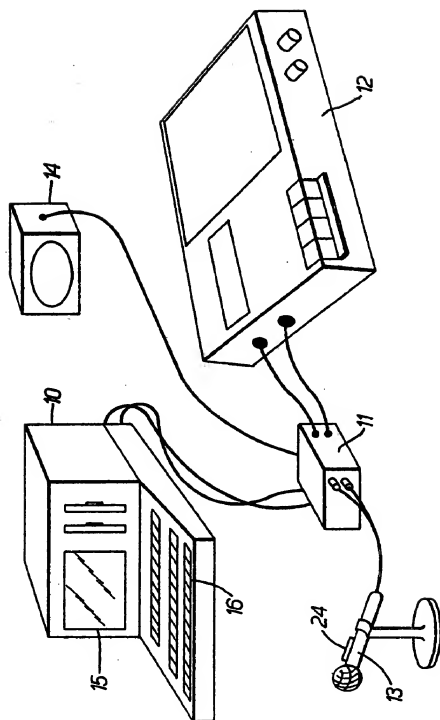


FIG. 1.



## SPECIFICATION

## Word-processor systems

This invention concerns word-processor systems, and relates in particular to the use in such systems of methods and apparatus enabling the annotation of the text with comments.

It has long been common practice for written documents to be prepared in draft form, the draft being considered, and if necessary amended, before being prepared in final form. The text — the word content — of the document is decided by the originator of the document, while the actual physical operation of preparing the document (by typing, say) is usually effected by a person skilled in the relevant art (or typing). Thus: a letter is dictated by the originator (who is not skilled in typing) to a secretary (who is); the secretary types the letter in draft form and returns it to the originator for "checking"; any necessary amendments are effected; and the letter is typed again in its final form.

While Instructions regarding any changes can be written upon the draft itself, nevertheless, because it is often convenient to prepare the draft as though it were in the final form (so that, if there are no changes, it is in fact in its final form, and may be used as such), it is considered good practice for the originator checking the draft to write his comments not upon the draft but instead upon a separate paper associated with the draft, each comment including information identifying the portion of the draft's text to which it refers. The typist can then go through the draft checking it against the comments, or go through the comments checking them against the draft, so as to identify, and effect, the necessary text changes, and thus produce the document in its final form.

Although the equipment and procedures in the modern office may differ from the system just described, the concepts remain the same. In the modern office increasing use is being made of word-processors — that is to say, word/text writing devices akin to the typewriter but operated in conjunction with a microcomputer (a microprocessor) so that the data (the text) input to the device may be stored in convenient (usually digital) form, manipulated as required, and then displayed in any suitable way (typically using a television-type screen commonly referred to as a Visual Display Unit, or VDU). It may often be the case that text originating from a first person (the originator) but prepared by a second person (a secretary, say) using a word-processor is to be considered and commented upon (perhaps by way of amendment) by the originator in much the same way as a draft type-written document conventionally prepared by a typist is to be checked by the originator, but that the text is most conveniently presented to the originator using a VDU instead of in the form of "hard copy" on paper. Additionally, it may well be the case that the originator is unfamiliar with the VDU equipment and/or the skills necessary to use that equipment to give effect to his comments (to

amend the text, say) or that his VDU is itself not equipped for effecting his wishes. The invention seeks to provide an arrangement whereby the text originator may append comments to the "draft" text displayed on the VDU, in a manner akin to putting the comments on an associated piece of paper, together with information identifying the portion of text to which the comments apply, but in a way more befitting the technology employed in word-processors and the modern automated office.

In one aspect, therefore, the invention provides, for use in a word-processor system, a method of supplying the text in a form wherein it is annotated with comments. In which method: using recording means operable under the control both of the word-processor and of the commentator, information identifying the relevant portion of text currently displayed is caused by the word-processor to be recorded, and the required comments are caused by the commentator to be recorded in association with the text-identifying information; and thereafter the word-processor is operated to display the text, and the recording means is operated to play back the comments, the text-identifying information associated with each comment being used by the word-processor to select the appropriate combination of text for display and comments for play-back.

In another aspect the invention provides, for use in a word-processor system, apparatus for supplying the text in a form wherein it is annotated with comments, which apparatus includes:

recording means operable under the control both of the word-processor and of the commentator;

means enabling the word-processor to cause the recording means to record information identifying the relevant portion of text currently displayed;

means enabling the commentator to cause the recording means to record the required comments in association with the text-identifying information;

and means whereby the word-processor may be operated to display the text, and the recording means may be operated to play back the comments, such that the text-identifying information associated with each comment is used by the word-processor to select the appropriate combination of text for display and comments for play-back.

Although in general the expression "word-processor" where used herein has its normal significance, it should be appreciated that "text" need not be purely words but could be any form of visible data — such as lists or arrays of numbers, or pictures — capable of being stored (commonly in digital form), displayed and manipulated by the system. Similarly, the "comments" with which the commentator annotates the text may take any data form and physical form that can be recorded and played back by the recording means, though

— as discussed further hereinafter — it is envisaged that the most useful physical form of comments will be speech recorded in conventional analogue fashion. Thus, for "word-processor system" one can read "computer-driven data processing and display system", and thereafter for "word-processor" one can read "computer", and for "text" one can read "data". Nevertheless, the invention is intended primarily for use in the annotation of text in true word-processor systems, and is so described hereinafter.

The invention employs recording means operating under the control both of the word-processor and of the commentator. It is a primary objective of the invention that it should be useable with present-day word-processing equipment, and at no great additional cost, and therefore, while the recording means could be an integral part of the word-processor, it is most conveniently physically separate therefrom (though operatively connected thereto by some suitable interface end/or connection means). For the same reasons of convenience and cost, the recording means itself is most advantageously quite conventional in nature, and is preferably a magnetic tape or disc recorder — for example, a standard office dictating machine or one of those tape recorders known as cassette recorders (as opposed to the reel-to-reel type) — with, or modified so as to have, control means whereby the operation of the device may be controlled by the word-processor under the overall control of the commentator. A standard type of tape recorder usually has a microphone input, a remote switch input (controlling the drive motor), an auxiliary input, and an earphone output; with the addition of a suitable interface junction box and switch gear (as described hereinafter), such a recorder is quite acceptable.

The recording means is operable, under the control of the word-processor (or, more accurately, of the program controlling the word-processor). This control of the recording means takes two forms. Firstly, the word-processor needs to be able to turn the recording means on and off (to start end stop the drive motor of a tape recorder, say), and secondly the word-processor needs to be able to cause there to be recorded the desired text-identifying information. It will be seen that these requirements can easily be met when employing a conventional tape recorder; the remote switch input can be connected to the word-processor for turning on or off the recorder, while the signal input may be connected to the word-processor for supplying the text-identifying information.

The recording means is also operable under the control of the commentator (the person making the comments). Again, this control takes the two forms — turning on and off the recording means, either in record or playback mode, as appropriate, and recording the desired comments — and again it will easily be appreciated that the requirements can very conveniently be met using the remote switch input and the microphone input of a

conventional tape recorder.

Because both the word-processor and the commentator need to control the operation of the recording means it is convenient if the controlling means — the various switches and connections — are appropriately interlinked. Indeed, it is most preferred if the on/off control of the recording means by the commentator is effected through the word-processor — and on an advantageous way of achieving this is to arrange that the on/off control exercised by the commentator does not directly turn on (or off) the recording means but instead constitutes a signal to the word-processor to turn on (or off) the recording means. Thus, when the commentator is ready to record a comment he moves to "on" his recording means on/off switch, and this "instructs" the word-processor to turn on the recording means (and perhaps then generate end output to the recording means the necessary text-identifying information). Similarly, after the commentator has recorded his comment he moves his switch to "off", and this "instructs" the word-processor to turn off the recording means.

The word-processor causes there to be recorded information identifying the relevant portion of text currently being displayed, this information being used by the word-processor during playback to select the combination of that particular portion of text for display together with the comments recorded by the recording means in association with this information. The text-identifying information can take a number of different forms (provided, of course, they are all readable by the word-processor). Thus, for example, the information could itself directly identify the text portion, or alternatively the information could indirectly identify the text portion, by directly or indirectly identifying a processor memory location in which is stored the actual text portion identification. Illustrating this, direct identification is achieved by the information being a processor-readable representation of a text page and/or line number, while indirect identification is attained by the information being a simple marker pulse (these being counted to achieve identification of the corresponding portion of text) or preferably a processor-readable representation of a code number (the sequential number of the associated comment, say), this code number identifying the whereabouts of a memory location containing the current page and/or line number and/or cursor position relevant to the text in question.

It is desirable if, when the word-processor is actually recording the text-identifying information, the commentator be made aware of this fact, so that he knows that the system is operating and that he should not begin speaking until it is ready to record his comment. This can be achieved by arranging for the word-processor to provide a "speak-after-this" tone while it is recording the information, and it is convenient if the information itself, appropriately modulated for recording, is employed as the tone.

The relevant portion of text being identified may be as large or as small, as general or as specific, as required. For example, the text-identifying information could merely identify the whole of the text occupying the "page" being displayed (this "page" preferably being an updated version of the original page, taking account of any previous changes to the text), but where appropriate it advantageously identifies the text more specifically — thus, by line or, ideally, by the relevant word or letter. The choice of which text portion is so identified can be determined, for example, by the position of some form of pointer movable about the display under the control of the commentator. With a conventional VDU displaying alphanumeric data, for instance, a light pen can be pointed at the screen, or the cursor can be moved around the screen, to mark individual characters (and thus the "words" containing the characters, and the lines containing the words), and the text-identifying information can then ultimately define not merely the "page" of text currently containing the marked portion but also the position of the cursor on the VDU, so pointing to the very word that needs correction.

The generation of the text-identifying information may be effected in any way appropriate, and conveniently it will be an entirely automatic process (controlled by the word-processor — or its program), in which the commentator need take no part. Thus, with a typical VDU display system, for example, the word-processor constantly maintains up-to-date identification of the displayed page and the position of the cursor on the screen, and is ready to output this at any time — and the time chosen may be whatever time is convenient to the commentator. It may, for example, be when he is ready to record a comment, or it may be after he has finished recording the previous comment. In either case the commentator may indicate the chosen moment by operating a switch on the word-processor dedicated to that purpose, but most conveniently (and using the preferred control interlink arrangement discussed hereinbefore) he does so simply by switching on (or off, as appropriate) his recording means remote switch, so instructing the word-processor both to turn on (or off) the recording means and to record thereon the necessary text-identifying information (if the latter is an indirect identification, then it may conveniently be recorded at the end of the previous comment, before the recording means is actually switched off).

The text-identification information is recorded on the recording means in association with the related comments. In addition it may be desirable to mark the text itself to show the relevant portion thereof, and in one preferred embodiment a suitable marker is placed thereon so that as the text is displayed there can be seen which portions thereof have recorded comments associated with them.

When playing back the recorded comments in

association with a display of the relevant text portions, the system of the invention may be utilised in two distinct ways. In the first way, the text may be displayed page by page (or marked portion by marked portion), the word-processor then searching through the recorded text-identification information to find that relevant to the currently displayed text portion, and thus to find the comments associated therewith.

However, though in theory this is attractive, and might indeed be preferred from an operator point of view, nevertheless, because of the problems arising from the difficulties of arranging the preferred cassette recorder or dictating machine to be controlled both as regards record and playback and as regards fast forward and fast rewind, and because of the delay inherent in any serial access device like a tape recorder, it is very much preferred to play back the record (the tape cassette, say), and have the word-processor then use the text-identifying information to identify, locate and display the relevant text portions before continuing to play back the associated comments. This latter way is very much the better having regard to the properties of standard tape recorders (or dictating machines) and typical word-processors, and for such an embodiment of the invention is therefore to be preferred.

Whichever of these two playback modes is used it is desirable that the displayed text be marked to show the particular portion of text relating to the recorded comment presently selected (and that this marking should be quite separate from any marking used simply to indicate which text portions have related comments). The marking may be effected in any convenient way, and where the text is displayed on a VDU examples are the position of the cursor or the use of reverse video or "bright-up".

An embodiment of the invention is now described, though only by way of illustration, with reference to the accompanying drawings in which:—

Figure 1 shows in perspective view an artistic impression of the main components of the apparatus used in the invention; and

Figure 2 shows a block diagram of the relevant operating parts of the apparatus of Figure 1.

The apparatus of the Figures is a combination of a word-processor (10), with its on-board computer (20 in Figure 2) running under the control of an interactive program, a small amount of interfacing equipment (11), a standard office cassette tape dictating machine (12) having input and output sockets and a remote control (21, 22, and 23 in Figure 2) for recording and reproducing speech and other analogue information, and hence suitably encoded digital information, a microphone (13), and a speaker (14 — which may be in the form of earphones). The recorder 12 is operated via the computer 20, and is able to respond fairly quickly to "start" and "stop" commands from the computer.

The operation of the system falls clearly into

two phases — annotation and edit.

#### Annotation

The user interacts with the word-processor's computer 20 by means of a visual display unit (VDU) — 15) and the word-processor's keyboard (16). In this way he indicates the portion of text or other information he wishes to annotate. He then instructs the computer 20 to make a note of that text portion by operating the 'remote' switch (24 — shown separately in Figure 2) on the microphone 13. The computer 20 then activates the recorder 12, and immediately records on it a unique burst of digital information identifying the comment to be made and the text presently being displayed. The digital information is appropriately recorded on the medium used — a modem (modulator/demodulator) operating at 1070 and 1270 Hertz is suitable for a cassette tape — and in this case is simply a serial number for the comment about to be made. The computer also stores, in some machine-readable form, and in such a way that it can be identified and retrieved from the text-identifying information recorded with the comment, sufficient information to allow the subsequent retrieval of the corresponding displayed text. After recording the identifying digital information, the computer 20 connects the microphone 13 to the recorder 12, and the user's speech comment (or other analogue information) is then recorded in the normal way.

The user can, of course, employ the recorder's conventional controls to play back his own comments (to check, for example, that he has dealt fully with the particular matter to which any comment relates).

#### Edit

At the start of the edit session, the computer 20 first identifies the body of text or other information to which the annotations refer, either by asking the user or by reading a special block of digital information recorded with the analogue information before the start of the annotation procedure. It then begins playing back the tape, and reads the first burst of text-identifying digital information; when the user is ready, it employs that text identification (or that identifying information most recently read) to retrieve, from the machine-readable record created during annotation, the position in the text to which the subsequent comment refers. The computer 20 then displays the appropriate portion of the text, and causes the recorded comment to be re-played to the user by the recorder 12. Thus, the user now hears through the speaker (or earphones) 14 what the annotator said while looking at the text portion about which he said it. When the computer 20, which is all the while monitoring the signal from the recorder 12, detects the next burst of text-identifying digital information, it suppresses the output of the speaker (or earphones) 14, reads the identifying information (so enabling it subsequently to locate and display the next corresponding portion of text), and then stops the

recorder 12. It then waits for the user to indicate readiness to have the next comment replayed (which will normally be after the user has effected the editorial changes to the text necessitated by the previous comment) and then the next relevant portion of text is displayed, the recorder 12 is re-started, the speaker (or earphones) 14 is switched in, and the cycle repeats.

If necessary, the user can of course employ the recorder's conventional controls to replay any particular comments. Naturally, so doing may cause the text-identifying information relating to that comment to be read again, the computer then re-selecting the appropriate text for display.

The block diagram of Figure 2 is self-explanatory, particularly having regard to the comments already given. Nevertheless, the following additional remarks can usefully be made.

Control of the flow of data in and around the system is effected by the word-processor's in-built micro-computer 20 (M/P), the main routing and switching component of the system being the multiplexors (X/Y). When activated (with the microphone remote switch 24) the computer switches on the tape recorder 12 (using the recorder's remote switch control 23), prepares and transmits via the multiplexor to the recorder for recording the text identifying information, and then switches the multiplexor to its microphone input 21, so connecting the microphone 13 to the recorder. For playback, the computer again operates the recorder via the remote switch control and uses the multiplexor to switch the speaker (or earphones) 14 in or out as appropriate. In each case, the modem is employed to convert the computer's yes/no digital output into suitable tone pulses for input to the recorder, and to convert the recorder's tone-pulse output into digital signals for the computer, and various level changers, buffers and amplifiers are employed as required.

#### CLAIMS

1. For use in a word-processor system, apparatus for supplying the text in a form wherein it is annotated with comments, which apparatus includes:

recording means operable under the control both of the word-processor and of the commentator;

means enabling the word-processor to cause the recording means to record information identifying the relevant portion of text currently displayed;

means enabling the commentator to cause the recording means to record the required comments in association with the text-identifying information; and

means whereby the word-processor may be operated to display the text, and the recording means may be operated to play back the comments, such that the text-identifying information associated with each comment is used by the word-processor to select the appropriate combination of text for display and

comments for play-back.

2. Apparatus as claimed in claim 1, wherein the recording means is physically separate from the word-processor though operatively connected thereto.

3. Apparatus as claimed in claim 2, wherein the recording means is a magnetic tape recorder.

4. Apparatus as claimed in any of the preceding claims, wherein control of the recording means by the commentator is effected through the word-processor.

5. Apparatus as claimed in any of the preceding claims, wherein the text-identifying information indirectly identifies the text portion, by directly or indirectly identifying a processor memory location in which is stored the actual text portion identification.

6. Apparatus as claimed in claim 5, wherein the text-identifying information is either a simple marker pulse (these being counted to achieve identification of the corresponding portion of text) or is a processor-readable representation of a code number identifying the memory location containing the information relevant to the text portion.

7. Apparatus as claimed in any of the preceding claims, where the text-identifying information defines not merely the "page" of text currently containing the relevant portion but where appropriate also the very word that needs correction.

8. Apparatus as claimed in any of the preceding

claims, wherein the text-identifying information is recorded immediately prior to the recording of the corresponding comment.

9. Apparatus as claimed in any of the preceding claims and substantially as described hereinbefore.

10. For use in a word-processor system, a method of supplying the text in a form wherein it is annotated with comments, in which method: using recording means operable under the control both of the word-processor and of the commentator, information identifying the relevant portion of text currently displayed is caused by the word-processor to be recorded, and the required comments are caused by the commentator to be recorded in association with the text-identifying information;

and thereafter the word-processor is operated to display the text, and the recording means is operated to play back the comments, the text-identifying information associated with each comment being used by the word-processor to select the appropriate combination of text for display and comments for play-back.

11. A method as claimed in claim 10, in which the recording means is operated to play back the comments, the word-processor then using the text-identifying information to identify, locate and display the relevant text portions.

12. A method as claimed in either of claims 10 and 11 and substantially as described hereinbefore.